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Bacteriological aspect of burns at Acute Burn Unit, Yangon General Hospital

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A cross-sectional descriptive study was carried out from June 2004 to April 2006 to determine the bacterial profile and antibiotic susceptibility pattern of burn isolates in patients admitted to Acute Burn Unit, Yangon General Hospital. Among 91 burn patients, 38 (41.8%) were culture-positive comprising pure isolates (27, 71.1%) and mixed isolates (11, 28.9%). The isolated bacterial pathogens were *Pseudomonas aeruginosa* (17/38, 44.8%), *Staphylococcus aureus* (14/38, 36.8%), *Klebsiella* species (3/38, 7.9%), *Proteus* species (3/38, 7.9%) and *Escherichia coli* (1/38, 2.6%). *Pseudomonas aeruginosa* isolates were sensitive to amikacin (100%), ciprofloxacin (94.1%) and gentamycin (82.3%). Augmentin and cefotaxime appeared to be most effective for *Staphylococcus aureus.* Majority of culture positive cases suffered from the burn wounds of buttock and leg. Burn injuries of more than 25% of total body surface area were found in 32 (84.2%) and those of less than 25% of total body surface area were found in 6 (15.8%) of 38 septic cases.

INTRODUCTION

Burn remains a major health problem throughout the world. Although survival after serious burn injuries has improved substantially during the past fifty years, infection of burn wound is still one of the leading causes of morbidity, mortality and long-term disability [1].

Following the initial period of shock, infection is the major complication in burns and it has been estimated that 75% of mortality associated with burns is related to infection. [2]. Extensive burns contribute to immunosuppression and this renders such patients prone to invasive bacterial infections. To ensure earlier and appropriate therapy in burn patients, most patients had been exposed to unnecessary antibiotics. Therefore, a continuous surveillance of microorganisms and regular up-date of their antibiotic resistance pattern is essential to maintain proper infection control programme respect to drugs choice for therapy [3].

As our country is on the way to develop as an industrialized nation, the incidence of burn injuries would be unavoidably increased as occupational hazard. Thus, the present study was carried out at Acute Burn Unit, Yangon General Hospital to detect common infectious organisms of burn and the current trends of antibiotic susceptibility pattern of them with the aim to provide updated information for management of burn injuries.

MATERIALS AND METHODS

The study design was hospital-based descriptive study. The wound swab samples were collected from a total of 91 burn

patients admitted to Acute Burn Unit, Yangon General Hospital from June 2004 to April 2006. They were inoculated into Stuart's transport media and transported to Bacteriology Research Division, Department of Medical Research (Lower Myanmar). After incubating overnight, they were inoculated onto Blood, Chocolate, Nutrient, Mannitol Salt, Ashdown and Mac Conkey agar and incubated again at 37°C overnight.

The suspected colonies were isolated and identified using Gram staining, biochemical testing and serological testing according to standard identification methods. Antibiotic susceptibility test was carried out using agar diffusion method.

RESULTS

Out of 91 cases, *Staphylococcus aureus, Pseudomonas aeruginosa, Proteus, Klebsiella* & *E.coli* were isolated from 38 (41.8 %) cases and among them, 27 (71.1%) were single isolates and 11 (28.9%) were mixed isolates. The Gram-positive cocci were isolated from 14 (36.8%), cases and *Staph. aureus* was the highest isolated cocci in this study. The Gram-negative bacilli were isolated from 24 (63.2%) cases and the highest isolated bacillus was *Pseudomonas aeruginosa* (Table 1).

Table 1. The percentage of isolated Gram-positive cocci and Gram-negative bacilli

Isolated bacterial patho - gens (n=38)	Type of organisms	No. of isolates	Percentage of isolates
Gram- positive cocci	*Staphylococcus aureus*	14/38	36.8
Gram- negative bacilli	*Pseudomonas* spp.	17/38	44.8
	Klebsiella spp.	3/38	7.9
	Proteus spp.	3/38	7.9
	Escherichia coli	1/38	2.6

As shown in Table 2 the isolated Gram-positive cocci were highly susceptible to augmentin and cefotaxine and the isolated Gram-negative bacilli were highly susceptible to ciprofloxacin and amikacin.

It was observed that male patients were more suffered from burns compared to females and burn cases were more in 25 -35 years age group (Table 3).

Table 2. Antibiotic sensitivity pattern of isolated Gram-negative bacilli and Gram- positive cocci

No.	Type of anti-biotics	% of sensitive isolates		% of intermediate isolates		% of resistant isolates	
		*Gnb	**Gpc	*Gnb	**Gpc	*Gnb	**Gpc
1	Amikacin	91.7	71.4	8.3	-	-	28.6
2	Ciproflo-xacin	91.7	78.6	-	-	8.3	21.4
3	Genta-mycin	79.2	57.1	-	7.2	20.8	35.7
4	Septrin	79.2	57.1	-	-	20.8	42.9
5	Ampicillin	70.8	71.4	-	-	29.2	28.6
6	Augmen-tin	66.7	85.7	8.3	-	2.5	14.3
7	Cefota-xime	66.7	85.7	12.5	-	20.8	14.3
8	Ceftria-xine	62.5	64.3	20.8	14.3	16.7	21.4
9	Chloram-phenicol	l58.3	42.9	12.5	-	29.2	57.1
10	Penicillin	50.0	78.6		-	50.0	21.4
11	Cloxa-cillin	29.2	28.6	-	-	70.8	71.4

* Gnb = Gram-negative bacilli
** Gpc = Gram-positive cocci

Table 3. Age and sex distribution of burn cases with sepsis wounds

Age group (Year)	Sex		Total
	Male	Female	
> 5 - ≤ 15	2	-	2
>15 - ≤ 25	3	2	5
> 25 - ≤ 35	16	4	20
> 35 - ≤ 45	4	3	7
> 45 - 55	2	2	4
Total	27	11	38

DISCUSSION

Burns provide a suitable site for bacterial multiplication and more persistent richer sources of infection than surgical wounds, mainly because of the larger area involved and longer duration of patient stay in the hospital. In this study, culture was positive in 38/91 (41.8%) cases of burn unit. *Pseudomonas aeruginosa* was the

commonest isolated bacilli and this finding coincides with many previous reports by Agnihotri *et. al.* (2004) and Mc Mances *et. al*, [3,4]. Although *Staph. aureus* was the predominant organism in some reports [5,6,7,8], it was the second most common isolate in this study (Table1). Beta-haemolytic *streptococcus* was not isolated. Single bacteria isolation was more than mixed isolation and it was also in agreement with other studies [6, 8].

In this study, *Klebsiella* spp. accounted for 7.9% of total isolates. This is similar to Agnirotri *et. al.* (2004) report but other studies reported *Klebsiella* spp. as the leading pathogen in burn wound infections [3, 7 ,9].

For epidemiological and clinical purposes, the antibiotic sensitivity test of isolated bacteria is important. In this study, the predominant bacterial isolates were highly resistant to commonly available antibiotics. *Pseudomonas aeruginosa* was highly sensitive to amikacin (100%), ciprofloxacin (84.5%) and gentamycin (82.3%). *Staphylo-coccus aureus* was highly sensitive to augmentin and cefotaxime (85.7%).

The most common sites of infection in burn wounds were buttock (31.6%) and buttock and leg (26.3%) which may be due to pressure effect or contamination with excreta.

In conclusion, the early detection of isolates is also very important to prevent treatment failure. For the isolation and identification of bacteria, performing antibiotic sensitivity it could take 48 hours from receiving the specimen. This time period may be enough to allow a subclinical infection to become life threatening illness. Secondly, in burn wounds, because of the mixed infection, the potential virulence of one organism may affect another organisms growing alongside. Another factor adding to complication is multi-drug resistance of the organisms. Once MDR strain becomes established in the hospital environment this can persist for months. Therefore, careful microbiological surveillance and *in vitro* testing before the start of antibiotic therapy and restrictive antibiotic policy may be of great help in the prevention and treatment of MDR isolates in burn units thereby reducing overall infection related morbidity and mortality.

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